LEVEL II

(2)

RFSS

BISTATIC CLUTTER - PROPOSED MODEL FOR NEAR TERM

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With the present configuration of the RFSS it is possible to simulate realistic clutter for a semi-active missile seeker system. The proposed model will be based on homogeneous terrain so that it will be possible to precompte certain parameters that describe the Doppler spectrum of the clutter signal as a function of the engagement geometry. The basic methodology is discussed ~~in Reference 1,~~ although much research still must be done to relate the clutter parameters to the specific engagement geometry.

The goal of the simulation will be to create a signal that has the proper Doppler spectrum in terms of shape and location. Energy will be generated at the proper spectral band that is a function of the engagement geometry, and considerable care will be taken to avoid generating energy in those spectral bands where there is no clutter. Less emphasis will be placed on generating the "correct" statistics of the clutter since this aspect of the problem is still controversial and it is more costly to simulate non-Rayleigh signals. The nonhomogeneous nature of clutter, while it represents more realism, is an unwarranted complexity at this stage of hardware-in-the-loop simulation technology. Therefore the proposed clutter model will treat clutter as a spatially smooth phenomenon, where the spectral

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1. Mitchell, R. L., and I. P. Bottlik, "Techniques for Simulating Realistic RF Environment Signals on the RFSS," MRI Report 131-25, Section 6.2, 28 Feb., 1977.

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shape is determined only by the weighting introduced by the transmit and receive beams as angle is transformed into Doppler frequency.

The above philosophy is presently being implemented in a range-gated system (Tri-Fast). For a semi-active system, the Doppler resolution cell will intersect a larger area on the ground than the range-Doppler cell in the range-gated system. Since more scatterers appear in a resolution cell, the radar system will be less sensitive to clutter nonhomogenetics and non-Rayleigh statistics.